

TAPE JOINT CEMENT ADDITIVE

This is a continuation of application Ser. No. 743,306, filed July 9, 1968, now abandoned.

This invention relates in general to tape joints cement and more particularly to a cement additive for joint cements which improves the properties such as workability and low temperature adhesion of the joint cement. In another aspect, the invention provides a novel method for the preparation of a sensibly dry-free-flowing composition adapted to be mixed with water to form a tape joint cement.

Tape joint cements are utilized in the application of wallboard, their function being to fill the spaces between adjoining boards to provide a smooth seamless surface. Typically, the space is filled with the tape joint cement and lapped for an inch or two to either side of the wallboard, and perforated paper tape is pressed into the cement until embedded, whereupon excess cement is wiped clean and the cement in which the tape is embedded is thereafter permitted to dry. If desired, additional coats can be applied to effect a particular object, i.e., whether the surface is to be painted, wall papered, etc. Since the tape joint cement is normally applied to uncompleted structures, that is, structures which do not have facilities for heating or cooling, it is necessary that the tape joint cement possess adhesive qualities which remain reasonably constant over a wide range of temperatures. For example, when the tape joint cement is applied to the wallboard during a cold season, it is generally applied at the temperature which exists outside of the structure and can be as low as 32°F. or lower. On the other hand, it is not uncommon to apply the tape joint cement at temperatures of 90°F. or higher.

At present, tape joint cements are marketed in two forms, namely, a "ready-mix" which is a finished formulation needing only stirring before application and a "dry-mixture" which is in the form of a sensibly dry free-flowing powder to which water is added and stirred until a workable consistency is attained. In either form, the essential components are a major proportion of an inert filler, such as, for example, calcium carbonate, clay, mica, silica, asbestos, and the like, and a minor proportion of a binder which serves to hold the cement together and prevent crumbling. The binder also adhesively bonds the cement to the wallboard and secures the applied tape thereto.

Various materials are being employed as the binder ingredient in tape joint cements. Recently poly(vinylacetate) resins have received considerable attention as the binder material because the poly(vinylacetate) resins have overcome the important objections and disadvantages of using other binding materials known to the art. For example, when employing casein as the binder material in dry-mix systems, the mixture with water gives a uniform composition only with great difficulty and, moreover in dry-mix and ready-mix systems, the casein is subject to putrefaction on aging. Unfortunately, however, when poly(vinylacetate) resins are employed in ready-mix systems, the resulting tape joint cement generally suffers from lack of proper workability and affords poor low temperature adhesion. In the preparation of dry-mix cements, the problems are even more pronounced because the poly(vinylacetate) resins must be employed in a particular manner such as for example in the manner described in U.S. Pat. No. 3,084,133, or in the method described in the applica-

tion of E. J. Mills and J. F. Suter, Ser. No. 600,741, filed Dec. 12, 1966, now U.S. Pat. No. 3,483,156. This is so because the poly(vinylacetate) resins in dry form cannot be blended satisfactorily with the dry filler because of poor dispersion when water is added. The use of spray-dried poly(vinylacetate) resins as the binder material permits dry-mixing, however elaborate precautions must be taken to insure that the blend of filler and spray-dried poly(vinylacetate) remains dry until ready for use. Thus, it will be seen that when employing poly(vinylacetate) as the binder, that two different forms of the poly(vinylacetate) are required to form either the ready-mix or dry-mix cements. Moreover, as mentioned previously, the resulting cement has poor workability and poor adhesion at low temperatures.

We have discovered a chemical additive which can be incorporated into tape joint cement compositions employing polyvinylacetate resins as the binder material which additive improves the low temperature adhesion and workability of the tape joint cement. More significantly however, we have found that the chemical additive of the present invention permits the preparation of either a ready-mix or dry-mix from the same form of poly(vinylacetate) starting material as will be described hereafter. The chemical additive of the present invention is poly(1,2-dimethyl-5-vinyl-pyridinium methylsulfate) referred to hereafter as "chemical additive." The polymer generally has a reduced viscosity of 0.8-1.5 in 0.5 M sodium bisulfite, and can be obtained commercially under the trade name POLYMER X-150 sold by Union Carbide Corporation. In general the chemical additive can be prepared by polymerizing in water solution, the monomer 1,2-dimethyl-5-vinyl-pyridinium methyl sulfate using a peroxide catalyst such as potassium persulfate.

As mentioned previously, the chemical additive of the present invention can be utilized with ready-mix or dry-mix tape joint systems comprising poly(vinylacetate) as the binder material. In ready-mix systems, the additive can be added simultaneously with the other ingredients such as filler, polyvinylacetate, water etc., and the whole admixture then processed by conventional technique for producing ready-mix tape joint cement. Alternatively the chemical additive can be added to the ready-mix as such i.e., after admixture of the formulating ingredients.

When added in dry-mix systems, the chemical additive can be incorporated with the poly(vinylacetate) binder, whether in the form of sprayed dried poly(vinylacetate), or in an aqueous dispersion of poly(vinylacetate) as taught in the method disclosed in U.S. Pat. No. 3,084,133 or in the application of E. J. Mills and J. F. Suter above referred to. The additive can also be added to the formulated dry-mix as such or added with the water at the time the water is added to the dry-mix. It is preferred however, to employ the chemical additive in dry-mix systems in the form of a free-flowing powder. Generally, the chemical additive is produced as a 30 percent aqueous solution, which can be processed by conventional techniques to remove the water content. Merely as illustrative, the solution can be admixed with the filler such as calcium carbonate, agitated, and thereafter dried. The dried material is then micro-pulverized through a screen into a free-flowing powder.

The chemical additive is added to the joint cement ingredients or to the finished joint cement in an amount of about 0.5 to about 5.0 per cent, preferably 2.5 to 3.5